pollen had ever reached the stigma, or that having reached it, favorable conditions for germination were present. *Laburnum vulgare*, as a case in point, remains self-sterile in the absence of slight mutilations produced by insect visitors. Many examples of species with both self-sterile and self-fertile races or varieties are mentioned. An enormous variation in the degree of self-sterility is noted: at one extreme, self-pollination produces but slightly fewer seeds than cross-pollination; while at the other, a few cases are known in which the stigma and pollen of the same flower are mutually poisonous. Environment produces a marked effect on this phenomenon, as often a change in climate changes self-sterile plants to self-fertile ones. *Biophytum sensitivum* is recorded as self-sterile in its open and self-fertile in its cleistogamous flowers. Our knowledge of causes is exceedingly vague and fragmentary. Examination of stigmas fertilized with their own pollen has shown that although germination takes place, the pollen tube is inhibited in its growth in some way so that it never reaches the embryo sac. In JOST's experiments no artificial medium was discovered in which pollen tubes would grow their normal length. COMPTON suggests the presence of a soluble diffusible substance in the stigmatic or stylar tissues which acts in a positive manner toward promoting pollen tube growth. An analogy between self-fertility and immunity, and self-fertility and infection is drawn, in line with the suggestive work of JOST, SCHIFF-GIORGIONI, and others. A special section is devoted to a review of the investigations of BAUR, CORRENS, and COMPTON, on the inheritance of self-sterility, and its racial as opposed to its individual nature. Suggestive analogies are also drawn between self-sterility and certain sexual phenomena, such as non-conjugation and conjugation between different strains in certain species of *Mucor*, *Spirogyra*, and *Dasycladus*. The suggestion is made that so-called sex-differentiation in the Mucorineae may be associated with a simple type of self-sterility; homothallic species would lack inhibitors, while heterothallic species might possess two such inhibitory factors. This paper is replete with suggestion and is a review of incalculable value to all students of general biology.—O. E. WHITE.

The wood of Pinus.—GROOM and RUSHTON,[8] in their detailed account of the wood of the five East Indian pines, have kept several objects in view: the affinities of the species, tropical (hydrophytic) or xerophytic features of the wood structure, relationship of the latter to leaf structure, and the nature of the so-called "bars of Sanio." They have devoted the first part of their work to a general statement and discussion, and in the second part have given a detailed description of each species.

P. excelsa and *P. Gerardiana* belong to the HAPLOXYLON section, having single bundles to the leaves, deciduous sheaths on the spurs, tangential pitting

[8] GROOM, PERCY, and RUSHTON, W., Structure of the wood of East Indian species of *Pinus*. Jour. Linn. Soc. Bot. **41**:457–490. *pls. 24, 25*. 1913. GROOM has also given a brief account of the critical identification of the wood of the five East Indian pines in the Indian Forester **39**:409–411. 1913.

on outermost tracheids of the summer wood, and ray tracheids with almost smooth walls. In *P. excelsa* the needles are in fives and the umbo of the cone scale is terminal. The ray pitting of the tracheids, too, is of the large simple type (Grosseiporen). It thus belongs to subsection CEMBRA, and having long cones and thin cone scales belongs to the *Strobus* group. They note that, "as regards width of spring-tracheids, the American species, belonging to the section HAPLOXYLON that most closely approach it, likewise belong to the group *Strobus*," but draw attention to one difference, the thick horizontal walls of the ray cell of *P. excelsa*, which, according to PENHALLOW, is not characteristic of the CEMBRA type. *P. Gerardiana* has a thick cone scale with central umbo, three leaves to the fascicle, and so belongs to the subsection PARACEMBRA of KOEHNE, which has small ray pitting on its tracheids. Like the other haploxylic forms, it has uniseriate tracheary pitting.

The other three species, *P. longifolia*, *P. Khasya*, and *P. Merkusii*, have 3, 3, and 2 needles, respectively, but "agree not only in the diploxylic nature of the leaves, the persistent nature of the sheath of the dwarf shoot, and the possession of a central umbo on the thick cone-scale, but also in that the transition from spring wood to summer wood is sudden (except in *P. Khasya*), the outermost tracheids of the annual ring do not universally bear pits on the tangential walls, the pits on the radial walls of the spring tracheids are often 2-seriate, and the ray tracheids are denticulate."

The authors consider that the pitting of *P. Merkusii* is of extreme interest, showing a transition between that of the cordaitean or araucarian forms and the ordinary abietineous type. The pits are "in one, two, or three rows, or in peculiar nests, of 3 or 4." These nests are surrounded by "Sanio's rims." The similar condition found by SANIO himself in the root of *P. silvestris* seems to have been overlooked, but at least *P. Merkusii* is the only pine so far described with nests in the stem. They compare this cluster pitting to the well known condition described by PENHALLOW in *Cordaites Newberryii*, and to that in *Cedroxylon transiens* of GOTHAN. These clusters of pits correspond to the "starlike" arrangement which GOTHAN considers as intermediate between araucarian and typical abietinean pitting.

With regard to ecological features, they state: "the tracheids are shortest (3 mm.) in the xerophilous *Pinus Gerardiana*, attain a length of 4 mm. in *P. excelsa* and *P. longifolia*, and 4.6 mm. in *P. Khasya*, and the relatively great length of 7 mm. in the tropical *P. Merkusii*. The size of the tracheids is also commented upon, but a separate article dealing with this point is in process of publication. It has a thick cuticle and hypoderma, much transfusion tissue and "a great development of resin ducts," all in excess of *P. excelsa*. Of the other three they state: "as regards leaf structure, all have stomata on all their faces. *P. longifolia*, the most clearly tending to xerophily, has the thickest cuticle (though not so thick as *P. Gerardiana*), and *P. Khasya* has the thinnest. *P. Merkusii* has the most numerous lines of stomata. . . . . In the more xerophilous *P. longifolia* the endodermis has markedly thickened outer walls,

in *P. Merkusii* this is less marked, while in *P. Khasya* there is no indication of such thickening. All three species contrast with the haploxylic Indian species in the feebler development of the tissue separating the endodermis from the vascular tissue."

These structural ecological results are certainly very interesting, and GROOM's further contribution, which is already in the press, will no doubt add valuable results. It is very desirable that further studies be made on material where the ecological factors are definitely known, and also that a single species be studied under its extreme of wet and dry conditions, in order to determine how much of the change is inherent in the species itself and how much is really due to the external conditions.

The so-called "bars of Sanio" of the Harvard school come in for very severe criticism. They show that these are composed partly at least of pectic compounds, but not of cellulose. They also consider that Miss GERRY mistook SANIO's description of trabeculae for these structures, and propose the term "Sanio's rims" for them, a terminology which is certainly much more in keeping with SANIO's idea ("die Umriss des Primordialtüpfels"). Miss GERRY, however, made a much more serious mistake, for she even quotes SANIO's description of the torus ("diese scheibenförmige Verdickung") as referring to the structures in question.

Resin plates were also found in some of the tracheids adjacent to the rays and also true trabeculae. The authors have also noted the presence of tracheids with bent ends: "when abutting on a medullary ray the end may fork, or bend, so as to run for some distance along the ray and thus form a transition towards a ray tracheid." They also found such tracheids forming radial series apart from the medullary rays.

The detailed description of the species is so arranged that easy reference can be had to any particular feature.—R. B. THOMSON.

Some Jurassic plants.—Among the pteridophytes described by THOMAS[9] from the Marske Quarry of the Middle Jurassic of the Cleveland district of Yorkshire is a new marattiaceous fern, *Marattiopsis anglica*. The genus is "a very common Rhetic and Liassic form, and has been recorded from Sweden, Bornholm, Germany, Poland, and Tongking. Recently two incomplete leaflets from the Jurassic (Kimmeridge) beds of Sutherland have been placed by SEWARD in this genus. Allied forms from the Jurassic of Oregon have been described by LESTER WARD and others under the old name of *Angiopteridium*." Both fertile and infertile pinnae were found. The synangia are considered to have "projected somewhat above the surface, and to have had a fairly firm wall enclosing a number of loculi arranged in two rows; each loculus probably

[9] THOMAS, HUGH HAMSHAW, The fossil flora of the Cleveland District of Yorkshire: I. The flora of the Marske Quarry. Quart. Jour. Geol. Soc. **69**:223–251. *pls. 23–26*. 1913.